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In-situ Diffraction Studies of Shock Compressed Single-Crystal Iron

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In-situ Diffraction Studies of Shock Compressed Single-Crystal Iron*

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The technique of in-situ wide angle diffraction has been used to study materials such as Si and Cu. We have extended our studies of shocked single crystal materials to include Fe (001) that is shock compressed by direct laser irradiation using the OMEGA and Janus lasers. A series of experiments was conducted in Fe at pressures above the Hugoniot Elastic Limit. Transient x-ray was used to record the response of multiple lattice planes simultaneously. This technique of wide-angle diffraction provides information on the lattice response both parallel and oblique to the shock propagation direction. In these experiments, compressions of up to 14% in the (002) planes were observed. Details on the experiments and analysis of the dynamic lattice compression will be presented.

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